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New Patent Claims:

1. Method for determining the probable life of a piece of equipment in an industrial plant which uses multiple regression analysis to express an expected life in terms of variables relevant for the life, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

   a) determining a start value as first influencing-parameter,

   b) generating a current equation based on the start value and thereby entering the start value as equation-parameter into the equation,

   c) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameter(s),

   d) selecting as new equation-parameter the influencing-parameter with the highest significance and the lowest correlation that is not an equation-parameter and has according to a parameter-database not been used as equation-parameter in combination with the equation-parameters of the current equation,

e) replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters now including the new equation-parameter by means of multiple regression analysis based on the values of the value-database,

f) recording in parameter-database the combination of influencing-parameters already used as equation-parameters and the order of introducing the equation-parameters into the current equation,

g) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database

h) repeating the steps c) to g) until for none of the influencing-parameters that are not equation-parameters the significance is higher than a predetermined value while at the same time the correlation is lower than a predetermined value or either the significance of an equation-parameter has become lower than a predetermined value or the correlation of an equation-parameter becomes higher than a predetermined value,

i) excluding the influencing-parameter that according to the parameter-database was last selected as new equation-parameter and replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters that remain after exclusion of the last selected influencing-

parameter by means of multiple regression analysis based on the values of the value-database,

j) repeating the steps c) to i) until the influencing-parameter to be excluded is the start value,

k) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database.

2. Method for determining the probable life of a piece of equipment in an industrial plant which uses multiple regression analysis to express an expected life in terms of variables relevant for the life, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

a) generating a current equation based on the all influencing-parameters and as further influencing-parameter a determined start-value as equation-parameters by means of multiple regression analysis based on the values of the value-database,

b) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameters,

c) selecting as new unnecessary influencing-parameter the equation-parameter with the lowest significance and the highest correlation

that is according to a parameter-database not an unnecessary influencing-parameter and whose removal as equation-parameter does according to a parameter-database not lead to a combination of equation-parameters that according to the parameter-database has previously been used ,

d) replacing the current equation with a new current equation by generating the new current equation based on the set of equation-parameters from which the new unnecessary influencing-parameter has been removed by means of multiple regression analysis based on the values of the value-database,

e) recording in the parameter-database the combinations of parameters used and the order of removal of unnecessary influencing-parameters from the current equation,

f) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database,

g) repeating the steps b) to f) until for none of the influencing-parameters that are equation-parameters either the significance is lower than a predetermined value or the correlation is higher than a predetermined value or for one of the unnecessary-parameters the significance has become higher than a predetermined value while at the same time the correlation has become lower than a predetermined value.

h) re-introducing the influencing-parameter that according to the parameter-database was last removed as new unnecessary influencing-parameter,

i) repeating the steps b) to h) until either the influencing-parameter to be excluded is the start value or until no equation-parameter that has a significance that is lower than a predetermined value or a correlation that is higher than a predetermined value can be excluded without leading to a combination of equation-parameters that has already been sampled,

j) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database.

3. Method according to claim 1 or 2, consisting at least of the following steps:

- identifying the variables relevant for the life of the piece of equipment,

- collecting data for the variables relevant for the life of the piece of equipment and the according life,

- performing a multiple regression analysis using the collected data to determine for the variables factors of influence on the life,

- generating a formula of the type used in multiple regression analysis, expressing the expected life in terms of the variables using the factors of influence found.

4. Method according to claim 3, wherein the data is taken from a control system and/or the operational history of an industrial plant and/or the design of the industrial plant.

5. Method for performing maintenance on an industrial plant, whereby operational data and/or design data of the industrial plant is fed into a system, which generates at least one value for an expected life of one piece of equipment of the industrial plant and whereby the piece of equipment is exchanged when the actual life equates to the predicted life or a value derived from the predicted life, whereby

- the system uses a formula of the type used in multiple regression analysis, expressing the expected life in terms of variables relevant for the life using factors of influence, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

a) determining a start value as first influencing-parameter,

b) generating a current equation based on the start value and thereby entering the start value as equation-parameter into the equation,

c) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameter(s),

d) selecting as new equation-parameter the influencing-parameter with the highest significance and the lowest correlation that is not an equation-parameter and has according to a parameter-database not been used as equation-parameter in combination with the equation-parameters of the current equation,

e) replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters now including the new equation-parameter by means of multiple regression analysis based on the values of the value-database,

f) recording in parameter-database the combination of influencing-parameters already used as equation-parameters and the order of introducing the equation-parameters into the current equation,

g) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database

h) repeating the steps c) to g) until for none of the influencing-parameters that are not equation-parameters the significance is higher than a predetermined value while at the same time the correlation is lower than a predetermined value or either the significance of an equation-parameter has become lower than a prede-

termined value or the correlation of an equation-parameter becomes higher than a predetermined value,

i) excluding the influencing-parameter that according to the parameter-database was last selected as new equation-parameter and replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters that remain after exclusion of the last selected influencing-parameter by means of multiple regression analysis based on the values of the value-database,

j) repeating the steps c) to i) until the influencing-parameter to be excluded is the start value,

k) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database.

- the factors of influence are found by performing a multiple regression analysis using data collected for variables relevant for the life and the according life.

6. Method for performing maintenance on an industrial plant, whereby operational data and/or design data of the industrial plant is fed into a system, which generates at least one value for an expected life of one piece of equipment of the industrial plant and whereby the piece of

equipment is exchanged when the actual life equates to the predicted life or a value derived from the predicted life, whereby

- the system uses a formula of the type used in multiple regression analysis, expressing the expected life in terms of variables relevant for the life using factors of influence, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

a) generating a current equation based on the all influencing-parameters and as further influencing-parameter a determined start-value as equation-parameters by means of multiple regression analysis based on the values of the value-database,

b) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameters,

c) selecting as new unnecessary influencing-parameter the equation-parameter with the lowest significance and the highest correlation that is according to a parameter-database not an unnecessary influencing-parameter and whose removal as equation-parameter does according to a parameter-database not lead to a combination of equation-parameters that according to the parameter-database has previously been used ,

d) replacing the current equation with a new current equation by generating the new current equation based on the set of equation-

parameters from which the new unnecessary influencing-parameter has been removed by means of multiple regression analysis based on the values of the value-database,

e) recording in the parameter-database the combinations of parameters used and the order of removal of unnecessary influencing-parameters from the current equation,

f) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database,

g) repeating the steps b) to f) until for none of the influencing-parameters that are equation-parameters either the significance is lower than a predetermined value or the correlation is higher than a predetermined value or for one of the unnecessary-parameters the significance has become higher than a predetermined value while at the same time the correlation has become lower than a predetermined value.

h) re-introducing the influencing-parameter that according to the parameter-database was last removed as new unnecessary influencing-parameter,

i) repeating the steps b) to h) until either the influencing-parameter to be excluded is the start value or until no equation-parameter that has a significance that is lower than a predetermined value or a correlation that is higher than a predetermined value can be ex-

cluded without leading to a combination of equation-parameters that has already been sampled,

j) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database,

- the factors of influence are found by performing a multiple regression analysis using data collected for variables relevant for the life and the according life.

7. Method according to claim 5 or 6, characterised in that collected data for variables relevant for the life from a piece of equipment of the same type which failed pre-predicted is used to modify the factors of influence.

8. Maintenance-System consisting of a calculating unit, a storage unit, an input unit characterised in that

- a formula of the type used in multiple regression analysis that expresses an expected life of a piece of equipment in terms of influencing-parameters relevant for the life and factors of influence is stored in the storage unit, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

a) determining a start value as first influencing-parameter,

b) generating a current equation based on the start value and thereby entering the start value as equation-parameter into the equation,

c) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameter(s),

d) selecting as new equation-parameter the influencing-parameter with the highest significance and the lowest correlation that is not an equation-parameter and has according to a parameter-database not been used as equation-parameter in combination with the equation-parameters of the current equation,

e) replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters now including the new equation-parameter by means of multiple regression analysis based on the values of the value-database,

f) recording in parameter-database the combination of influencing-parameters already used as equation-parameters and the order of introducing the equation-parameters into the current equation,

g) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database

h) repeating the steps c) to g) until for none of the influencing-parameters that are not equation-parameters the significance is higher than a predetermined value while at the same time the correlation is lower than a predetermined value or either the significance of an equation-parameter has become lower than a predetermined value or the correlation of an equation-parameter becomes higher than a predetermined value,

i) excluding the influencing-parameter that according to the parameter-database was last selected as new equation-parameter and replacing the current equation with a new current equation by generating the new current equation based on the equation-parameters that remain after exclusion of the last selected influencing-parameter by means of multiple regression analysis based on the values of the value-database,

j) repeating the steps c) to i) until the influencing-parameter to be excluded is the start value,

k) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database,

- the calculating unit is adapted to read the formula from the storage unit,

- the calculating unit is adapted to apply the formula to values for the variables received from the input unit and/or read from the storage unit so as to generate a value for an expected life.

9. Maintenance-System consisting of a calculating unit, a storage unit, an input unit characterised in that

- a formula of the type used in multiple regression analysis that expresses an expected life of a piece of equipment in terms of influencing-parameters relevant for the life and factors of influence is stored in the storage unit, whereby a formula to model the expected life from a value-database correlating individual values for the life with other individual values of one or more influencing-parameters, contains the following steps:

a) generating a current equation based on the all influencing-parameters and as further influencing-parameter a determined start-value as equation-parameters by means of multiple regression analysis based on the values of the value-database,

b) determining a significance value and a correlation value for each influencing-parameter with respect to the equation-parameters,

c) selecting as new unnecessary influencing-parameter the equation-parameter with the lowest significance and the highest correlation that is according to a parameter-database not an unnecessary influencing-parameter and whose removal as equation-parameter does according to a parameter-database not lead to a combination

of equation-parameters that according to the parameter-database has previously been used ,

d) replacing the current equation with a new current equation by generating the new current equation based on the set of equation-parameters from which the new unnecessary influencing-parameter has been removed by means of multiple regression analysis based on the values of the value-database,

e) recording in the parameter-database the combinations of parameters used and the order of removal of unnecessary influencing-parameters from the current equation,

f) calculating the performance of the current equation and recording this performance with reference to the equation-parameters in the current equation in a performance-database,

g) repeating the steps b) to f) until for none of the influencing-parameters that are equation-parameters either the significance is lower than a predetermined value or the correlation is higher than a predetermined value or for one of the unnecessary-parameters the significance has become higher than a predetermined value while at the same time the correlation has become lower than a predetermined value.

h) re-introducing the influencing-parameter that according to the parameter-database was last removed as new unnecessary influencing-parameter,

i) repeating the steps b) to h) until either the influencing-parameter to be excluded is the start value or until no equation-parameter that has a significance that is lower than a predetermined value or a correlation that is higher than a predetermined value can be excluded without leading to a combination of equation-parameters that has already been sampled,

j) selecting from the database the set of equation-parameters which provided the best performance and generating a final equation by use of multiple regression analysis based on these influencing-parameters and their individual values in the value-database,

- the calculating unit is adapted to read the formula from the storage unit,

- the calculating unit is adapted to apply the formula to values for the variables received from the input unit and/or read from the storage unit so as to generate a value for an expected life.

10. Maintenance-System according to claim 8 and 9, characterised in that the calculating unit is adapted to compare the value for an expected life with a value for the actual life generated from data received from the input unit and/or read from the storage unit to generate a value for remaining life.